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GEOGRAPHIC SCHOOL BULLETINS

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Hilde Brinckmann-Schröder

AS THOUGH LOOKING INTO THE WAR-CLOUDED FUTURE OF THEIR FREE CITY, DANZIG GIRLS IN 1939, HOLIDAY BOUND, GAZE PENSIVELY SHOREWARD

GEOGRAPHIC SCHOOL BULLETIN

HOW TEACHERS MAY OBTAIN THE BULLETINS

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Prewar Danzig's Free-City Status Was Unique

DANZIG, which has fallen within the scope of the current province-devouring Soviet drive, once had a unique position in the world. Before its 1939 seizure by Germany, this Baltic port at the end of the Polish Corridor was the world's only secular city-state—worthy successor to a long line of powerful free municipalities including ancient Athens and Sparta, medieval Venice and Lübeck, and Renaissance Florence.

Created by the Treaty of Versailles as a compromise between Germans and Poles, and under League of Nations supervision, the Free State of Danzig flew its own flag, made its own laws, coined its own money, had its customs inspectors, and operated its own ships.

The city is about 4 miles from the Baltic Sea, near the entry of the united Mottlau and Radaune rivers into the seaward-flowing Wisla (Vistula). The forking Mottlau and the Radaune course through the city (illustration, cover) and divide it into distinct sections. Growth took form on a semi-circular pattern. The five main sections were the Old, New, and Low towns, Granary Island, and Long Garden, the more modern part.

Windows a Key to Wealth

Towers, spires, and waves of gables made the skyline. Buildings were richly adorned. Churches were numerous and widely distributed. They ranged from Romanesque to Renaissance, from Roman Catholic to Mennonite. Burgomasters warmed their pews in the huge church of St. Mary with large Dutch ovens.

Among the city's show places was the Artushof, built in the 15th century as a social center for the merchants. It became an exchange in 1742. The Town Hall was a classic example of Gothic styling. A clock tower and rose window kept the modern railroad station in harmony with structural antiques.

Graphic old street names endured in the heart of the city. Holy Ghost Street connects with Cow Lane, Parson Lane, and Bread Counter Street. Old Horse Lane, Thread Lane, and the Street of Nine Eyes lead to the avenue called Pepper City. Narrow streets were made narrower by projecting balconies and balustrades. Ancient gateways arch a number of the streets (illustration, next page).

In Danzig a man's wealth could be roughly reckoned by the number of his front windows. Heavier taxes were levied on a house with three windows than on one with only two. Most houses had narrow fronts, running far back on their lots to gain space. Another reason for narrow fronts was that they presented a smaller target for besieging guns in olden times.

The Dead Wisla Carries a Lively Trade

Ships reach Danzig through the coastal harbor of Neufahrwasser, formed by a canal and basin at the western mouth of the Wisla. From Neufahrwasser the Danzig harbor district extends up the Wisla to the mouth of the Mottlau and along the branches of that river around Granary Island, fringed with wharves and warehouses, to the center of the city. Lack of current in the lower reaches of the Wisla caused that part of the stream to be called "the dead Wisla." Channels are virtually ice free.

Freighters loaded and unloaded at 18th-century timber-and-stucco warehouses. Marine facilities were modern. Local yards turned out some of Ger-

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WHERE COMMERCE-FURROWED RIVERS REACH THE SEA, HISTORIC PORTS OF WORLD-WIDE FAME DOT THE SOUTH CHINA COASTLINE

From Amoy came the tea for the Boston Tea Party. Foochow was the great port of the 19th-century tea trade, in which American clippers outraced everything on the high seas. To Canton, shortly after United States independence was recognized, went the first ship of the American merchant marine. Canton, Hong Kong, and Shanghai were ports of peacetime importance. Before the Japs came, Ningpo, Wenchow, and Swatow had special interest for American women as producers of Chinese lace and embroidery. They also exported hats and hat forms by the thousands. The Ningpo area is where several of Jimmy Doolittle's flyers landed after bombing Tokyo in the spring of 1942. The Japanese destroyed all the villages where the United States airmen received help.

South of Ningpo the Japs have never conquered the entire country, but have merely centered their power in the larger ports. Certain stretches of this coast, and several smaller ports, are free of the enemy. Formosa, large island off Fukien Province, has been held by Japan since 1895, and with the near-by Pescadores represents the first big Nipponese land grab (Bulletin No. 3).

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Dardanelles, Turkish Water Gate, Key to Southern Soviet Ports

THE Dardanelles, riverlike sea gate which German control of the Aegean has kept locked against the United Nations, has been thrown open to Allied shipping. United States supply ships bound for Soviet Russia may now use this key waterway connecting the Mediterranean and Black seas—one of the world's most valuable short cuts.

The swift waters of the Dardanelles separate Europe and Asia (illustration, next page), but Turkey straddles and controls the narrow channel—a fact which makes that only-recently-modernized country loom larger on the international scene than it otherwise would.

Chain of Channels Has Three Links

The Dardanelles is the westernmost link in a chain of three channels that Liberty and Victory ships must thread in going from the Mediterranean Sea to the Soviets' Black Sea ports. The central portion of the waterway is the relatively wide Marmara Denizi (Sea of Marmara). The final stretch is the Bosporus, edged by Istanbul (Constantinople) and its suburbs. The three links form a 172-mile-long water corridor through western Turkey.

Before reaching the Dardanelles, ships must work their way through the maze of rugged islands in the Aegean Sea, northward-reaching arm of the Mediterranean. The minor inconveniences of this route are nothing when weighed against the shipping mileage and time saved. Formerly the sole southern access to Soviet Russia was by ship to Persian Gulf ports, then overland across Iran—a longer, more time-consuming, and less efficient route than that provided by the Dardanelles.

Filling the gap between Europe and Asia the two straits and the intermediate sea operated as a sort of maritime traffic valve. The Dardanelles passage, about 35 miles of winding waterway, narrows from four miles to less than a mile. The sapphire Sea of Marmara—studded with rocky islands and named with the Greek word for rock—is about the size of Lake Champlain. Shorter and narrower than its southern counterpart, the 17-mile Strait of the Bosporus diminishes from one and one-half miles to a half-mile in width.

The narrower reaches of the two straits—where the shores are not more than four miles apart—total about 52 miles, more than the length of the Panama Canal. A fort anywhere on the narrows is in position to dispute passage. Gibraltar, by contrast, must keep watch over a nine-mile width of water.

Greek Name, Hellespont, Is from Mythology

Only through these constricted waters can world shipping get to the oil and lumber ports of Romania and the lower Danube River, the grain-shipping cities of the Ukraine, the oil ports of the Caucasus, and the city of Istanbul. Four of the lands which front the Black Sea—Bulgaria, Romania, the Ukraine, and the Georgian S.S.R.—have no ports except those reached through the Dardanelles. Ships of twenty nations normally enter the strait every year, but more than two-thirds of the peacetime commerce has been carried by the ships of Great Britain, Italy, Greece, Norway, and Russia.

From the castles of Dardanus, at the southwest entrance, the Strait of the Dardanelles got its name. Wind-swept and swift, this water lane is also called the Hellespont because it had the doubtful distinction of drowning Helle, mythical

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many's big fighting ships.

Cargoes moved in large volume over Danzig's waterways. To the city's wharves came food and fertilizers, chemicals and iron ore, machinery, building materials, and raw cotton. Outward bound were coal and timber, sugar and grain, cement and petroleum products, iron and steel. Timber was stored in "timber ponds" extending for miles along the waterfront. Railways and roads linked Danzig to the transportation network of northern Europe.

Besides shipyards the city had sawmills, breweries, and distilleries, and factories making amber wares, furniture, and cigarettes. "Goldwasser," a strong sweet liquor with bits of gold suspended in it, came from a distillery marked for three centuries by a salmon over its door.

Slightly more than half the size of Rhode Island, the Free City of Danzig's territory included about 408,000 people, most of them German by birth or background. The prewar population of the city itself was about 263,000. Next to it ranked Zoppot, a pleasure resort on the Baltic coast. The territory contained more than 250 villages and hamlets. It was squeezed between Germany's East Prussia and the Polish Corridor (Pomorze), cutting off all but the Gdynia region of the latter from the Baltic Sea.

Note: Danzig appears on the National Geographic Society's Map of Germany and Its Approaches, which was a supplement to the July, 1944, issue of the *National Geographic Magazine*. A price list of maps may be obtained from the Society's headquarters, Washington 6, D. C.

For further information, see "Historic Danzig: Last of the City-States," November, 1939*; and "War Clouds over Danzig and Poland's Port" (8 photographs), October, 1939*; and in the GEOGRAPHIC SCHOOL BULLETINS, November 1, 1943: "Nazi Targets Blasted by Bombers from Britain." *(Issues marked with an asterisk are included in a special list of Magazines available to teachers in packets of ten for $1.00.)*

Bulletin No. 1, February 12, 1945.

William Franklin

MODERN TRAFFIC PASSES UNDER AN ANCIENT GATE IN DANZIG

Under Danzig's 17th-century gateway, the Langgasser Tor, rolls a 20th-century truck loaded with prewar soldiers of the Free City. Across the arches the hardy and optimistic Danzigers have carved an inscription which translates into English as: "In harmony small states grow and in discord great ones fall." This massive stone structure, Italian Renaissance in style, marks the western end of the Langgasse, Danzig's principal street, which bisects the city from east to west.

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War Reaches Port Cities of the South China Coast

THE Chinese have a saying, "Everything new originates in Canton." Bearing this out they point to the fact that the earliest Chinese trade with the Western World centered at Canton (illustration, next page), and that Sun Yat Sen, who established the modern Chinese State, found his first followers there. The current bombing offensive against Japheld Chinese ports began with attacks on Canton, Amoy, and Swatow.

Along China's southern coast, a vital 1,000-mile sweep of mainland between Hong Kong and Shanghai, Japanese control centers in the ports. Enemy penetration is only skin-deep. A few miles inland from the port garrisons, the Chinese retain control. Some sizable reaches of the coast between major cities are likewise free of invaders. One important port, Foochow (Minhow), was not taken from the Chinese until the latter part of 1944.

The shore line from the Canton-Hong Kong area to Shanghai forms a gentle outward curve. It has countless minor irregularities, but no deep indentations except the Canton estuary, Hangchow Bay, and the mouth of the Yangtze (map, inside cover). The coast is rugged, rocky, and shattered into thousands of islands. Except at Shanghai, typhoons often rage, making ships scurry to the nearest typhoon shelter.

Rivers Are Railroads for China's Coast Cities

A bit of this coast is tropical, and much subtropical. Hong Kong lies on about the same latitude as Havana, Cuba, and Shanghai is no farther north than Savannah, Georgia. Orange groves, tea shrubs, and rice paddies are seen in profusion as far north as Foochow.

Railroads are not as important in serving Chinese ports as are rivers. Many of the coast cities have no railroads. Each port lies at the mouth of a river. Nearly all traffic is borne to and from the ports on water, making them really transshipment points between river and canal craft and ocean-going vessels.

Canton, about 90 miles from the open sea, is built on water trade. It lies at the head of an estuary into which flow several rivers. Estimates place from 100,000 to 200,000 of its 860,000 inhabitants actually living on the water, on junks, rafts, sampans, and barges.

Canton saw the birth of the foreign trade and merchant marine of the United States. Six months after England recognized the Colonies' independence the ship *Empress of China* was bound for Canton, and tea. She also brought back chinaware and silk. Thus started the fabulous China trade, in which Yankee-built clipper ships outraced everything on the sea. Before the Japanese invasion brought an interruption, one-third of modern Canton's exports came to the United States, mostly as raw silk.

On either side of the mouth of Canton's estuary lie two foreign colonies—Portuguese Macau and British Hong Kong. Macau was the thin edge of the wedge which Europe thrust into China in the 16th century that later opened most of the important ports of the empire to foreign trade. Little more than remembrance of past glory remains to Macau.

Latter Day Pirates Used Modern Methods

Hong Kong, Britain's great entrepôt across the bay, had nearly monopolized the foreign trade of all south China. It ranked as one of the world's principal ports, with a population of slightly over a million, 20,000 of whom were Caucasians.

Northeast of Hong Kong is Bias Bay, hangout of pirates. Though usually attacking junks or small native ships, these bold corsairs sometimes boarded steamers as passengers, overpowered the crews on the high seas, and took the ships to Bias Bay for looting and to hold rich passengers for ransom.

Swatow, Amoy, Chuanchow, and Foochow are four important ports opposite Japanese-held Formosa (Taiwan). Swatow was noted for its exports of linen embroidery and laces. This city of 178,000 had no wharves, but unloaded its ships at midriver pontoons which were bridged to the shore. As in most China ports, lighters also carried the cargo ashore from large ships.

Amoy supplied the tea for the Boston Tea Party. The British ships whose cargoes were dumped into Boston Bay in 1773 carried tea from this faraway Chinese city. Amoy lost its rich Formosa trade when Japan took that Chinese island in 1895. Its prewar population was 234,000.

The harbor of Chuanchow (Tsinkiang) admits only vessels of 10-foot draft or less, but Foochow has an anchorage for the largest vessels. A Chinese Navy yard and drydocks were located there. In the 1850's, '60's, and '70's Foochow was the most famous tea port in the

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princess of Thessaly, when she fell from the winged ram of the Golden Fleece while fleeing with her brother. The Turkish name for the Dardanelles is Çanakkale Boğazi; for the Bosporus, Karadeniz Boğazi. Boğazi means strait.

The elongated S of the Bosporus is one of the world's historic waterways. Medieval forts and castles and red-roofed villages line its shores. Villas peep from gardens and groves of umbrella pines.

Large steamers and small sailing craft, proceeding with caution, normally churn the curving course of the Bosporus. The surface current flows toward the Mediterranean, but a strong reverse undercurrent moves toward the Black Sea. Countercurrents swirl along the shores.

Turkey has held both straits for nearly 500 years, though the degree of control has changed from time to time. After the defeat of the Central Powers in the first World War, the Dardanelles was demilitarized, remaining so until 1936. In the summer of that year Turkey was permitted by treaty to bring troops back into the Dardanelles area and to refortify the straits.

Turkey and the Soviet Union were the chief beneficiaries of the 1936 treaty. Turkey's control over the straits was greatly strengthened; the Soviet Union was granted unlimited passage for her naval forces between the Black Sea and the Mediterranean.

Note: The Dardanelles is shown on the National Geographic Society's Map of Central Europe and the Mediterranean, and Map of Classical Lands of the Mediterranean.

For additional information, see "Old Pattern and New in Turkey," and "The Transformation of Turkey" (23 color photographs), in the *National Geographic Magazine* for January, 1939*; and "Summer Holidays on the Bosporus," and "Beside the Bosporus, Divider of Continents" (11 color photographs), October, 1929*; and "Remodeled Turkey Still a Doorstep to War Theaters," in the GEOGRAPHIC SCHOOL BULLETINS, May 17, 1943.

Bulletin No. 2, February 12, 1945.

Maynard Owen Williams

ASIA AND EUROPE SQUEEZE THE DARDANELLES INTO A RIVERLIKE STRAIT

This is the narrowest point of the 35-mile-long Dardanelles. Less than a mile separates Abydos on the Asiatic shore (foreground) from Sestos, on the European bank. Both sides belong to Turkey. German withdrawal from the Aegean Sea and its islands allows United Nations shipping to use this short cut to the Soviet Union. Here every night the mythical Leander swam across and back to see his lady Hero, until one night he perished in storm-tossed waters. Near here during the first World War British troops, in the ill-fated Gallipoli campaign, swarmed ashore. Turkey, then allied with Germany, beat off the attack and retained control of the Dardanelles until the end of the war.

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Sound Recording on Wire Is War Aid and Peacetime Promise

ON phonograph records you have heard sound coming from wax disks. While watching "movies" you have heard sound coming from motion picture film. The chances are you may not yet have heard sound reproduced from hair-fine steel wire on which it has been recorded by magnetism.

Today magnetic wire recording—"sound-on-wire"—is busy gathering military intelligence for the Allies. It is under fire in jeeps and foxholes in invasion areas, in submarines close to Tokyo, and in bombers over Berlin. Tomorrow it will be put to a hundred civilian uses that are waiting for it.

The Principle Is Nearly a Half-Century Old

In 1898, Valdemar Poulsen, Danish scientist, applied telephone engineering in transforming sound waves into waves of electric current in copper wire. Wrapping the wire around an iron core he induced in the core a magnetic field which likewise varied with the sound.

Poulsen's next step and great contribution to sound recording was to move a thick steel wire continuously in one direction across the varying magnetic field. He thus spotted tiny magnets representing the varying sound in a crosswise position along the moving wire. By reversing the several steps he re-created the sound.

The sound became jumbled, however, when the round wire twisted. Even slight twisting turned each crosswise-recorded magnet away from its position necessary for good reproduction. The twist was conquered by using flat steel tape instead of round wire. But tape proved unwieldy, and tape recording ran a poor second over the years in competition with wax cylinders and disks.

The principle of magnetizing wire which now promises a revolution in sound transmission lay dormant for 40 years after its discovery in 1898. Through the era of Bell, Edison, and Steinmetz its technical kinks went unironed.

Recorders Are Portable, Suited to War Uses

Studying Poulsen's recording method, a present-day physicist in the late 1930's reasoned that if the sound-induced magnets could be spotted lengthwise instead of crosswise along the moving wire, twisting would not affect reproduction, and hair-thin wire could be used for compactness. Painstaking experimentation removed the "bugs" in the original method.

Success of the new technique brings sound-on-wire close to perfection. Planes, tanks, ships, and submarines are gradually being equipped with compact, portable magnetic wire recorders and recorder-reproducers which civilians will welcome after the war. They faithfully record every detail of sound at the war fronts.

Recorders weigh only 8 pounds. This includes a half-pound of steel wire which is over two miles long and records 66 minutes of sound and speech. A 22- to 32-volt source of direct-current electricity is required.

Recorders which also reproduce weigh 35 pounds, run on 110-volt current, and look like a table-model short-wave radio set with a pair of doughnut-sized spools added. Between the spools is the tiny magnet recording head. War-action speech and sound can be immediately reproduced after recording by re-winding the wire and re-running it between spools with the recording head "talking" instead of "listening."

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world. American and British clippers loaded up with bohea tea and raced west. In the race of 1866 there was a difference of only 12 minutes between the first and second ships to reach the finish line in the English Channel—after a voyage of 16,000 miles.

Big ships stopped at Pagoda Anchorage, in the Min River 10 miles below Foochow. Transportation from there to the city was by colorful Ningpo junks. These high-pooped, seagoing vessels were also used in the coast traffic north to Shanghai. As in Canton, many of the 323,000 Foochowans lived on the water. One could nearly walk across the Min dryshod, so thick were the boats.

North of Wenchow (Yungkia) lies Ningpo (Ninghsien), China's great fishing center and one of the oldest treaty ports. Inland 12 miles on the Yung River, it is connected with Shanghai by rail. It had 219,000 inhabitants. Ningpo was the home of Generalissimo Chiang-Kai-Shek.

Hangchow, at the head of a deep bay in which a dangerous tidal bore runs, can scarcely be called a port. The bore is a wall of water stretching across the bay which reaches a height of 8 to 10 feet and rushes inland at a rate of about 15 miles an hour. Hangchow, with a population of half a million, is a great silk producing center, the southern terminus of the Grand Canal, and the city Marco Polo declared to be the noblest in the world. To him it was an Oriental Venice, for then, as now, water was the medium of commerce.

Northeast 110 miles by rail stands Shanghai, commercial capital of China and one of the large cities of the world. It had almost three and one-half million inhabitants, and handled nearly half of China's entire foreign trade. Shanghai's Bund, one of the world's famous streets, follows the Hwangpo River, a short, wide tidal stream flowing into the mouth of the Yangtze. Large steamers, docking there in peacetime, evidenced the fact that the China trade did not die with the China clipper.

Note: Coast cities of south China are shown on the Society's Map of Southeast Asia.

See also, "Today on the China Coast," in the *National Geographic Magazine* for February, 1945; and "I Lived on Formosa," January, 1945.

Bulletin No. 3, February 12, 1945.

Alfred T. Palmer

FOREIGNERS SAVED THIS ARCHED STREET DURING CANTON'S MODERNIZING ERA

After the fire of 1927 the city fathers of Canton feverishly set about improving their ancient city. Thousands of ramshackle buildings were razed to make way for paved streets. The Bund, formerly a muddy track along the river front, was transformed into a wide, well-paved street backed by eight- and nine-story hotels, department stores, and a modern custom-house. Even age-old cultural monuments were sometimes sacrificed. Foreigners living in Canton used their influence to preserve this bit of old China—a street repetitiously arched with *pai-lous*—from the wholesale modernization.

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Geo-Graphic Brevities

UPPER SILESIA WAS GERMANY'S EASTERN RUHR

SOVIET forces rolling westward from Kraków and Częstochowa quickly overran Upper Silesia, the southeasternmost region of Germany proper. The area described as Germany's Eastern Ruhr, however, was partly in prewar Poland. This German-Polish border-straddling industrial district ranked second only to the Ruhr as a concentration of industry supplying the Nazi war machine.

The area of this man-made blot on the Silesian landscape is roughly 300 square miles, one-fourth that of the Ruhr. More than half of it lies on the Polish side of the political boundary fixed by the League of Nations at Geneva in 1922. Its greatest concentration covers a rich coal deposit 25 miles from east to west and three to six miles wide.

In this area no single municipal center stands out, but six communities had "just growed" like Topsy, in haphazard fashion dictated by machine-age demands. Each of them had around 100,000 residents before the present war. They are Sosnowiec, Katowice, and Chorzów in Poland; Beuthen, Hindenburg, and Gleiwitz in Germany.

Together with a score or two of smaller towns stretching the full length of the coal deposit, these cities formed a continuous jumble of mining pits, iron and steel mills, blast furnaces, factories, railroad tracks, drab homes of workers, and commercial centers.

Europe's greatest zinc deposit lies north and east of Beuthen, split between the two countries by the 1922 boundary. Lead and iron also are mined and reduced. Most important by far, however, was the coal, which supported heavy industries including those making use of the local ores. Today the coal's importance is multiplied by German dependence on it as a source of synthetic gasoline.

The land of the district is the low divide separating the Wisla (Vistula) and Oder rivers. Considerably wooded and sandy, it had not been developed agriculturally like most of the rest of Silesia before industry caught up with it. Surface water is limited and mining has affected the underground supply, so that water is piped in from neighboring hills.

Trade routes from all directions traverse Upper Silesia. It is on the railroad and highways linking Berlin to Kraków, the Ukraine, and the Black Sea.

Note: Silesia is shown on the National Geographic Society's Map of Europe and the Near East, which was issued as a supplement to the *National Geographic Magazine* for June, 1943.

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INDIAN SIGNS GAVE RED MEN COMMON LANGUAGE

GESTURES of the American Indian sign language, now serving as a source of art forms for household decoration, had their most elaborate expression in North America in the Plains region.

The great treeless expanse stretching westward from the Missouri River to the Rocky Mountains and southward from Canada's Fraser River to the Rio Grande provided a spacious stage for the development of free-arm signaling. Tribes of many stocks roamed the broad flat lands, waging wars or engaging in the peaceful occupations of hunting, fishing, and growing grain and vegetables. A universal means of communication was needed.

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There are other military advantages (illustration, below). Sharp tilting inside planes and tanks, the vibrations caused by cannon and motor roar do not interrupt recording. The steel wire is not easily affected by temperature. It is not easily broken and can be repaired with a simple splice if a break occurs.

Wire recordings have been played 100,000 times without appreciable loss of sound detail. Yet, if desired, recordings on wire can be quickly "erased" and the wire can be used over and over again. Oversized spools and sufficient wire mileage make possible continuous recording for many hours in very limited space.

The family wire-spool album may take its place with the family phonograph album after the war. Complete sound-on-wire equipment, comparing in price with the home radio, will be capable of recording fireside conversations, amateur oratory, music, and drama. It will record favorite radio programs for reproduction at will. Wire may partially supplant Braille as a vehicle for books and articles for the blind.

See also "Winged Words—New Weapons of War" (Radio), in the *National Geographic Magazine* for November, 1942*; "The Miracle of Talking by Telephone," October, 1937*; and "New Safeguards for Ships in Fog and Storm," August, 1936*; and the following GEOGRAPHIC SCHOOL BULLETINS: "The Telegraph Leaves Its Mark on Geography," December 4, 1944; "Walkie-Talkie Climaxes Centuries of War News Flashes" (Geo-Graphic Brevity), October 2, 1944; and "Radar Just One Offspring of Up-and-Coming Electronics Family," April 3, 1944.

Bulletin No. 4, February 12, 1945.

Willard R. Culver

AUTOMATIC SOUND RECORDING ON WIRE WOULD AID THE OBSERVER

Inside the window, temperatures as low as 80 degrees below zero are manufactured to ascertain the effect of extreme cold on the human system. At the Army's Climatic Research Laboratory, Lawrence, Massachusetts, this snugly-wrapped G.I. guinea pig is transmitting his reactions to an observer who writes them down. In addition to the instruments shown, a "sound-on-wire" recorder could be used in many such experiments to record the spoken reactions and periodic scientific observations of men undergoing tests. Wire recordings, finding more and more uses in the armed forces, can be "played back" like ordinary wax phonograph records. The recording mechanism is compact, withstands hard knocks, is unaffected by temperature, and makes a sound record on hair-thin wire capable of being played 100,000 times or of being "erased" at any time, leaving the wire available for another impression.

For inter-tribal messages the hand served the need better than the tongue. The sign language enabled Indians from the geographic extremes of the region to talk with one another. If a Sioux from the north and an Apache from the southern plains met, they could discuss war or agriculture intelligibly. Kiowas, Cheyennes, and Crows were most adept with their fingers. Their silent meetings were occasions of grace as well as greeting.

Chicago Natural History Museum

A MESSAGE FROM A BRAVE IN BRONZE

Long before radio picked words from air waves, phonograph disks trapped them in wax. Scientists now record them on wire. Preceding all these mediums, the Indian's agile fingers tossed speech into the air with the gestures of his sign language. In bronze, Malvina Hoffman, famous American sculptor, has perpetuated this Blackfeet brave's tale of good hunting.

Signs were made with one hand or both. Originally they referred as closely as possible to the shape, habit, or purpose of the subject. Gradually they advanced from the picture idea and became fixed symbols. Local variations of its basic gestures enriched the hand-made vocabulary. In time it was adequate for the making of a treaty, the recital of tribal myths and legends, and the telling of hunting exploits and daring adventures of the braves.

Each tribe had a distinct sign for its identification—for a Blackfeet a moccasin would be touched and the fingers then rubbed on something black. For a Pawnee, one of "the wolf people," the right hand would be held at the side of the head with the fingers apart and pointing forward to simulate the erect ears of a wolf.

Man, woman, white man, Indian, tepee, horse, buffalo, cow, and dog—each had a similar motion in all sign dialects. Eating, drinking, sleeping, fatigue, truth and falsehood were other fundamentals transmitted through the arm-and-finger code.

Smoke signals and blanket waving belonged to another and cruder category. Their virtue was in their "legibility" at considerable distances. Hand signaling was the higher art, a system which became almost as perfect as the spoken word.

Note: For further information on Indians of North America, see "Indians of Our North Pacific Coast," in the *National Geographic Magazine* for January, 1945; "Indians of Our Western Plains," July, 1944; "Indian Tribes of Pueblo Land," November, 1940*; and "America's First Settlers, the Indians," November, 1937*.

Separate color sheets of North American Indians are available. A list will be sent on request to the Society's headquarters, Washington 6, D. C.

Bulletin No. 5, February 12, 1945.